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**TECHNICAL REPORT
NATICK/TR-96/015**

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CONTAINERIZED SELF-SERVICE LAUNDRY AND SMALL UNIT SHOWER IN OPERATION RESTORE DEMOCRACY

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13. ABSTRACT (Maximum 200 words) The Combat Service Support Battle Lab (CSSBL) sponsored a Battle Lab Warfighting Experiment (BLWE) in Haiti in November 1994. The BLWE was conducted by the Combined Arms Support Command (CASCOM) and the Natick Research, Development and Engineering Center. Equipment evaluated in the experiment included the Containerized Self-Service Laundry (CSSL), the Small Unit Shower (SUS) and the PACTO waterless latrine. The majority of the data was collected during the period 13-17 November 1994. The CSSL was used by 317 personnel who washed 472 loads of laundry. The number of hours per day the laundry was in operation ranged from 9.5 to 16.0 hrs. A total of 18,000 gal of water was used during this period. Additional data was collected after 17 Nov, but was not as accurate as that collected during the official period. The SUS was not operational until the final official day of the evaluation. Usage was erratic and proper data collection was unsuccessful. However, limited verbal feedback indicated the shower was reliable and provided consistent hot water and pressure. The PACTO latrine was primarily used by U.S. Marines. Data could not be collected, but feedback reflected positive customer acceptance.				
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PREFACE

The data for this report was collected jointly by personnel from the Logistics Concepts Directorate, Combined Arms Support Command (CASCOC), Fort Lee, VA and from the Advanced Systems Concepts Directorate at the U.S. Army Soldier Systems Command (SSCOM), Natick Research, Development and Engineering Center, Natick, MA during Operation Restore Democracy in Haiti. Data collection was undertaken in November 1994 under Project Element 62786.

Citation of trade names in this report does not constitute an official endorsement or approval of the use of such items.

SUMMARY

During Operation Restore Democracy in Haiti, the US Forces were deployed to an austere field environment. Little or no host-nation infrastructure existed to support the soldiers' quality of life. Despite preparation for this operation, latrines, showers and laundry services were inadequate.

In the latter part of October 1994, a request from the US Forces in Haiti was submitted to the Commandant, US Army Quartermaster Center & School (USAQMC&S) for field service support. The support requested was for equipment that could be operated with limited infrastructure and/or limited workload placed upon deployed field service units. Prototype equipment being developed by the Natick Research, Development and Engineering Center (Natick) was identified as candidates to support the operation. A joint decision from the Combat Service Support Battle Lab (CSSBL), the USAQMC&S and Natick was made to conduct a Battle Lab Warfighting Experiment (BLWE) in Haiti.

Based upon the availability of prototype items, Natick shipped the Containerized Self-Service Laundry (CSSL), the Small Unit Shower (SUS) and the PACTO™ (commercial name) waterless latrine to Haiti in November 1994. The data collection plan was coordinated with the appropriate points of contact on the ground.

The period of the official BLWE was from 12-17 November 1994. During this period, data was collected and submitted to Natick and the Combined Arms Support Command (CASCOC) for analysis. The analysis showed the operational concept for the CSSL and the SUS was sound. The PACTO latrine was well received by the supported units; however, the data collected was not enough to conduct a proper analysis. Technical analysis of the CSSL and the SUS showed these items performed in an excellent manner. Troop feedback on the CSSL was extremely positive and also provided many useful suggestions for improvement. The SUS was used on a limited basis; however, the concept was positively received.

CONTAINERIZED SELF-SERVICE LAUNDRY AND SMALL UNIT SHOWER IN OPERATION RESTORE DEMOCRACY

INTRODUCTION

The Battle Lab Warfighting Experiment (BLWE) conducted during Operation Restore Democracy in Haiti from 12-17 Nov 94 to test the Containerized Self-Service Laundry (CSSL), the Small Unit Shower (SUS) and the PACTO latrine was successful. The concept proved sound and the equipment met performance expectations. The Battle Lab Warfighting Experiment (BLWE) validated the feasibility, maturity and performance of the CSSL. This demonstrated an innovative and cost-effective solution which enhanced the quality of life for the soldier during Operation Restore Democracy.

The equipment container arrived in country via military airlift on 9 Nov 94. AMC Joint Logistics Support Command (JLSC) personnel directed placement of the equipment with the 52d Combat Eng. Bn (Heavy) from Ft. Carson, CO.

Combined Arms Support Command (CASCOM) personnel, CPT Lawrence Poole from Supply & Services Branch, LCD and Mr. Jon Walker from Sustain Branch, M&T conducted an evaluation of the prototype laundry and shower under the Battle Lab Warfighting Experiment process. Evaluation was conducted from 12-17 Nov 94. Equipment set-up and unit training was conducted by Mike Hope and Dave McCutcheon, U. S. Army Natick Research, Development and Engineering Center (NRDEC), who built the laundry unit.

Methods

Containerized Self-Service Laundry

The CSSL received widespread approval from soldiers and leaders. Soldiers found the service easy to operate, convenient to use and more reliable than the QM laundry service. Unit leaders were enthusiastic about the positive impact it had on unit morale (see Figure 1).

The laundry equipment demonstrated the capability to launder large quantities of clothes in forward areas. From 13-17 Nov, when water was available, the laundry operated for 63.5 hours. During that time the following data was collected:

Loads of wash completed	472
Average loads per hour	7.4
Peak load capacity	9.0
Max loads completed in 24 hour period	216
Average gallons water consumption per hour	284
Total gallons of water consumed	18,000

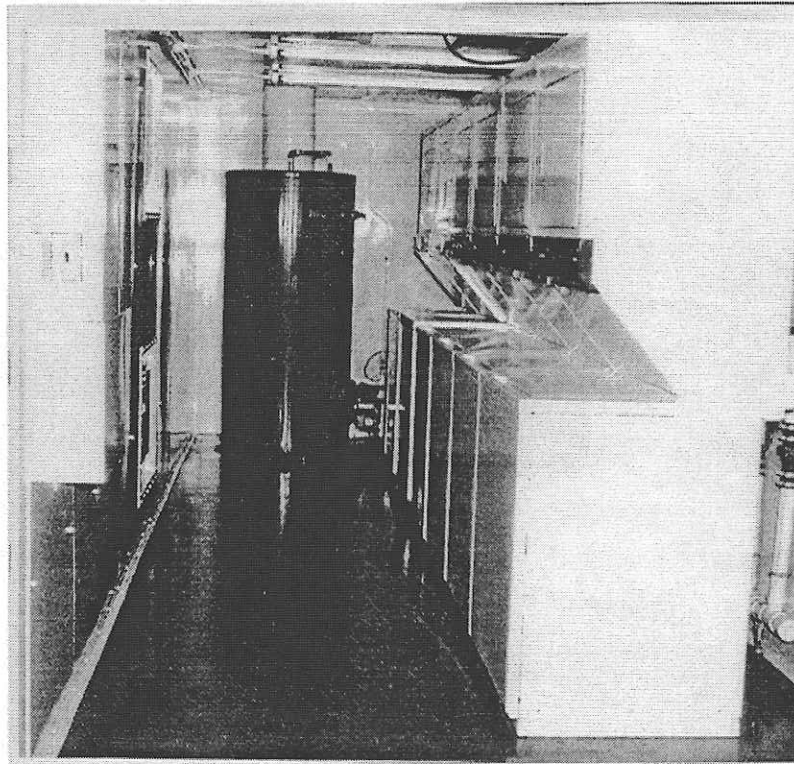


Figure 1. Containerized Self-Service Laundry.

Small Unit Shower

Due to problems associated with water support, generator availability and Tropical Storm Gordon, the shower was not operational until the final day of the evaluation period. Target group was the Bn's 50 female soldiers. Since other shower facilities were available, usage by the female soldiers was erratic and data collection unsuccessful.

However, during the time it was operational, the shower ran trouble free and earned praise from users on temperature of the heated water, ease of use and strength of water pressure.

Both units remained in place in Haiti for unit use until 1 Dec 94. Natick personnel returned at that time, retrieved available usage data and repacked the container for shipment to Guantanamo Bay, Cuba (see Figure 2).



Figure 2. Small Unit Shower

PACTO Latrine

The PACTO Latrine was originally targeted for use by the US Army units. Upon arrival in Haiti, it was decided that the PACTO would be located at a US Marine Corps base. No empirical data on use was collected; however, verbal conversations with Marines who used the PACTO were positive.

Due to a lack of a adequate infrastructure in Haiti, a significant benefit of using the PACTO is its waterless feature. To complicate matters, much of Haiti has low lying areas that cannot be excavated for septic systems. PACTO's waterless latrine eliminates the need for a holding (septic) tank for the black (waste) water. Plastic bags holding the waste are dropped into a waste bin and can be disposed of by incineration (see Figure 3).

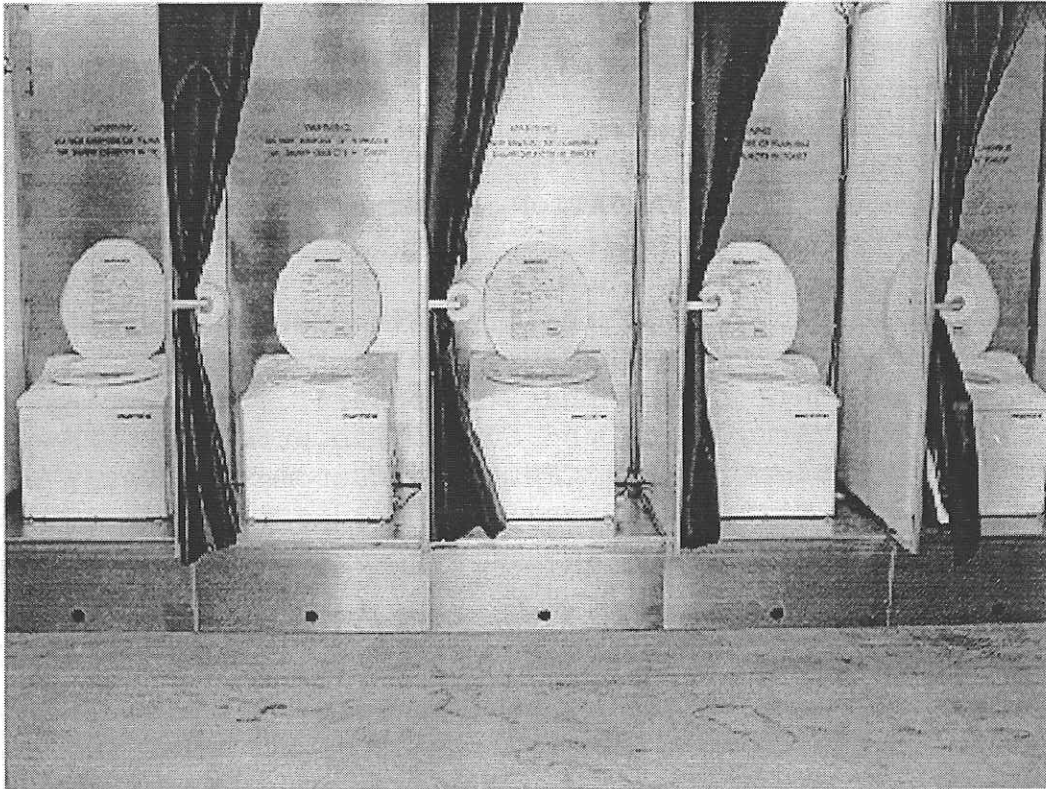


Figure 3. PACTO Latrine

Waste Water Disposal

Waste water disposal was not a problem at Camp Dragon. Adequate drainage ditches were readily available at the site. Prior to our arrival, the decision was made to use the existing drainage system. All waste water from shower points and other facilities within Camp Dragon was funneled into this drainage system.

Water Availability

When operating the laundry in a forward operational area, coordination for water support is a critical factor. Because of the high volume of water required, delivery of water determines usage of the facility. This could be alleviated somewhat by Supply and Services companies owning and positioning these units, since they manage water resources which can be directed when needed. It must be understood, however, that water for laundry is a lower priority than for drinking water and may not always be available when resources are limited.

EVALUATION PROCESS

Prior to deployment, the following Methods of Performance (MOP) and Methods of Evaluation (MOE) were developed in concert with the Combat Service Support Battle Lab, Ft. Lee, VA to guide the evaluation process. The methods for evaluating the CSSL were customer surveys, water usage data and visual observation. Soldiers were provided survey sheets upon completion of washing and drying their personal laundry.

The hypothesis for the CSSL to be addressed was: If soldiers are provided quick, satisfactory and reliable self-service laundry, then there would be a significant increase in the soldiers' quality of life and a reduction of stress on the quartermaster laundry system.

There were a number of expected results from the use of the CSSL. First, soldiers would be very satisfied with the opportunity to wash and dry their laundry at their leisure. While using the quartermaster laundry would free the soldier from performing this action, the laundry could be cleaned in a matter of minutes rather than days. This would reduce the quantity of clothing the soldier would be required to maintain. In the event soldiers deployed to Haiti with a minimal quantity of uniforms, the CSSL would provide those soldiers with the opportunity to have clean clothing on a daily basis.

The hypothesis for the SUS to be addressed was: If the supported soldiers can erect and operate a small, mobile shower facility, then the soldiers' ability to maintain personal hygiene can be significantly increased.

Since it was unclear where the SUS was going to be operating prior to its deployment to Haiti, it was expected that the SUS would be set up in a forward area supporting combat troops. Instead, the SUS was sent to an engineer battalion at a semi-fixed location. Since the engineer battalion already had contractor support for showers, the SUS was used by the female soldiers in the battalion. It was expected that the SUS would provide sufficient quantities of hot water at constant temperatures.

The PACTO latrine was basically an "add-on" to the deployment of the CSSL and the SUS. Within CONUS, there were no approved methods of disposal for the plastic bags containing the human waste. Haiti, provided the potential for use that did not exist in the USA. It was expected that U.S. Army troops would use the PACTO latrine; however, upon arrival, it was decided that US Marines would use it. Methods of expected disposal were burial and incineration.

Containerized Self-Service Laundry

The purpose of the laundry is to allow forward elements at battalion level to launder clothing as far forward as the unit combat trains, thus improving the soldiers' morale and hygiene. The CSSL allows the Field Service Company to more effectively serve the entire supported area.

Overall objective is to provide self-service laundry capability as a supplement to standard laundry and to improve morale at forward areas.

Methods of Performance and Methods of Evaluation

MOP: Ability to set-up the container quickly on the battlefield

MOE: Time req to off-load and be fully operational

Number of pers req to accomplish set-up
Number of pers req to maintain operations

MOP: Ability of the system to support self-service laundering by individual soldiers

MOE: Time required for soldier to launder clothes
Number of loads completed in 24-hour period
Impact on unit operations
Amt of reduction in batch laundry reqmts

MOP: Ability of machinery to maintain sustained operations

MOE: Downtime
Number of hours lost to breakdowns
Cost of breakdown
Who performs first level maintenance
Who repairs the system

Small Unit Shower

The purpose of the shower is the same as the laundry, improving morale and hygiene by allowing more than one shower per week.

Overall objective is to provide deployed soldiers more than one shower per week.

Methods of Performance and Methods of Evaluation

MOP: Ability to set-up the SUS quickly on the battlefield

MOE: Time req to off-load and be fully operational

Number of pers required to accomplish set-up
Number of personnel required to operate

MOP: Ability to provide 2 showers per week

MOE: Water consumption
Hot water temperature per shower
Impact on unit operations
Number of soldiers showered per day

MOP: Ability of machinery to maintain sustained operations

MOE: Downtime
Number of hours lost to breakdowns
Mean time of system component failures

INTERVIEW RESULTS

Interviews with the Command Group, CSM, Company Commanders and First Sergeants revealed unanimous support. The unit was viewed as a significant improvement in morale. Because of the road construction and quarry operations work conducted by this unit, clean clothes were seen as a mission enhancer, not merely a morale booster. No leader revealed any negative experiences caused by having the laundry located in the Bn area.

The largest requirement for laundry operations is water and power. Many units do not have available 30K generators. This must be fielded with the container, though it does have the capability to hook into commercial power if available. Water supply is more difficult. With a requirement for 8000-9000 gallons in a continuous 24 hour operation, water storage and delivery must be provided to units.

Prior to this study, this unit was sending 100-150 bundles of laundry to the QM laundry twice a week. Additionally, a 3,000 gal water storage tank was set up to provide a wash area for soldiers to hand wash clothing. This was widely used. Once the self-service laundry was in service, QM laundry bundles dropped to 36 for the entire week, and hand washing was being used only sporadically during the hours the laundry was waiting for water resupply.

RECOMMENDATION

Concept and materiel development documents for these items should continue to be developed. The Army should pursue adoption of a Non-Developmental Item (NDI) CSSL. The hot water capability of the prototype CSSL is not necessary and could be eliminated to reduce weight and cost. The data collected through this BLWE should be incorporated in an Operational Requirements Document (ORD) and resources provided to procure initial operational project stocks for use in future operations. The SUS has already been approved for purchase by units as a CTA item. The successful performance of the PACTO latrine as a waterless alternative warrants further investigation into this technology.

APPENDICES

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APPENDIX A
EXPERIMENT TIMETABLE

Appendix A

EXPERIMENT TIMETABLE

2 Nov - Laundry container is shipped from the Natick RD&E Center to Charleston, SC, for air shipment to Haiti.

8 Nov - Laundry MILVAN container is located sitting in the frustrated cargo section at the Charleston Air Base because the container is locked and no key is available. Telephonic approval from Natick to open container gets quick response, and equipment is readied for shipment. CASCOT personnel arrived in Port-au-Prince, Haiti on 8 Nov 94. They examined the proposed test site in the 1st Brigade Combat Team, 10th Mt. Div. area at Camp Dragon, conducted coordination with the 52nd Engineer Bn for site preparation, and met with Joint Logistics Support Command (JLSC) personnel regarding water support for the test.

9 Nov- The container arrived via C-141 at 1530 hrs and was reportedly delivered to Camp Dragon at 2230 hrs via 5 Ton tractor/trailer.

10 Nov- CPT Poole and Mr. Walker moved to the 1st BCT site, located the container in the neighboring Bangladesh camp, and started to work with the engineers and 1st BCT to set up support. We found the 1st BCT unreceptive and uncooperative. Generator support was unavailable. The unit was unwilling to provide soldier support to keep operating. The JLSC secured agreement from 52nd Eng Bn to locate the system in their AO.

11 Nov- Moved to 52nd Eng Bn area. Began coordination for required logistics support. Trailer with container moved to Bn area. Natick technicians arrived to begin set up.

12 Nov - Container positioned at prepared site. The 10K forklift was unable to lift the container because it was not working correctly. A crane was required to lift the container into position. Set up laundry unit, laid cable, set up water storage tank. Much of the set up time required is in tasks that must only be completed once after air shipment. In-theater ground moves will go much quicker. Observations: Temper tent possibly too extravagant. Any tent providing sheltered area for waiting and folding clothes in inclement weather will work. Generator support a problem in every unit. This Bn did not have a 30K generator either, but was able to lay cable to run off distant 100K. Generator and water storage tank must come with the equipment when it arrives.

13 Nov - Began operation when 3000 gal. of water was delivered at 0830 hrs. Laundry ran non-stop with a 2000 gal refill until 2300 hrs. Remained open all night as soldiers used dryers to dry clothes soaked by Tropical Storm George.

14 NOV - 3000 gal tank refilled at 1000 hrs, with an additional 2000 gal transferred later from nearby tank. Units ran continually until water ran out at 0200 hrs 15 Nov. Dryers continue to be used for drying.

15 Nov - Connected second 3000 gal storage tank. 5000 gal of water delivered at 1200 hrs. Natick technicians departed. Ran until 0530 when water ran out. Less traffic during the night.

16 Nov - Brown & Root (LOGCAP contractor) assumed water production and delivery mission on this day and experienced immediate problems with inadequate pumping capability. No deliveries were made and we were out of water entire day. The contractor was able to rectify their problems quickly with equipment provided by departing 1st COSCOM units and resumed deliveries late in the day. At 2130 the Bn XO spots a water tanker in 1st BCT area and redirects him to our area. 6000 gallons delivered. Resumed operation at 2130 with light traffic through the night.

17 Nov - First maintenance problem appears. A spin cycle safety lock activator broke off. CW3 Tuthill, the units generator/electrical maintenance supervisor and unit POC made repairs by switching a part from one of the float systems. One dryer drum stopped tumbling. Mr. Tuthill switched the dryer out with one of the extras provided by Natick for this purpose. Collected final evaluation and sign-in sheets. Conducted final interview with Bn XO. Departed area at 1300 hrs.

SHOWER: Emplacement of small unit shower was in question from day one. Shower facilities were in place in all base camp areas built and operated by the contractor by the time we arrived. The 1st BCT was not interested, so the JLSC was going to set up the shower as a display at the JLSC area. 52nd Eng Bn finally expressed interest, but water storage was a problem. Tropical Storm Gordon delayed set up due to high winds and excessive flooding. The shower was finally set up with a 400 gal water buffalo tank on 16 Nov. 50 females in the Bn were the target group. Initial usage reports were positive. The system worked well and has flexibility to use the heating elements and hoses even without the shelter. Because other shower sources were available, usage was low and data was insufficient to draw conclusions. This system has undergone previous field testing, however. It is ideally suited for smaller units not intending to leave the unit set up for extended periods of time.

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APPENDIX B
TEST RESULTS

Appendix B

TEST RESULTS

Containerized Self-Service Laundry

1. 13-17 Nov 95(Overall):

Bn strength	426.0
Total operating hours with water	63.5
Total loads of wash completed	472.0
Average loads per hour	7.4
Most loads completed in 24 hr period	216.0
Peak hour load capacity	9.0
Average water consumed per hour	284.0 gal
Total water consumed	18,000.0 gal
Average water used per cycle	38.0 gal
Average time spent in line	50 min
Loads per washer completed prior to 1st maint problem	66.0
Time lapsed before repair	1 hr

2. Daily results:

<u>Date</u>	<u># people</u>	<u>Loads</u>	<u>Operating Hrs</u>	<u>Water Delivered</u>
13 Nov	75	114	10.5	5000 gal
14 Nov	93	143	16.0	5000 gal
15 Nov	72	124	15.5	5000 gal
16 Nov	24	27	9.5	6000 gal
17 Nov	53	64	13.0	0 gal
				(3000 remaining)
	317	472	63.5	18000 used

3. Numbers used above were derived from sign in sheets located at the entrance to the laundry (See Appendix B). Simple math was applied to determine average uses based on the amounts of water used and hours laundry remained open. These statistics were maintained by the evaluators during the test period.

4. 17 Nov - 1 Dec 95. Additional sign in sheets for the period 17 Nov - 1 DEC were maintained after the evaluators departed. They were retrieved by the Natick personnel who packed up the container on 1 DEC 95. Results received indicate a daily average usage of 47 loads of wash /day during this period. There is no record of water deliveries. There is no way to know if all sign in sheets are present or if all customers signed in during this period. However, this sustained rate indicates that for a fixed population such as this, after the initial rush of customers in the first days of operation, usage approached something close to a once per week usage by each person. There are indications of continuing water shortage problems which also affected the numbers of wash loads completed.

5. Maintenance. There were few maintenance problems other than those mentioned in section II, 17 Nov. Two float systems were provided with the container to be used as replacements if repair could not be accomplished. These proved easy to install. The overall electrical, heating, water delivery, and drainage systems worked without any breakdowns. The individual washer/dryer sets worked well under continuous use.

APPENDIX C
QUESTIONNAIRE ANALYSIS

Appendix C

QUESTIONNAIRE ANALYSIS

General:

Questionnaires were completed randomly by 17% of customers. Responses showed overwhelming approval of the facility in use. Every aspect of the operation was rated positively, with the majority of all respondents describing themselves as extremely satisfied with every aspect evaluated. The only aspect drawing negative responses from a few customers was the adequacy of folding area space. This resulted largely from other customers using the folding table provided for card games and other waiting room activities.

Two types of washer/dryer combinations were available in the laundry. Customers expressed satisfaction with both models. Of those questioned who had used both types of units, 3 out of 4 preferred the touch panel controls over the rotary dial controls.

The folding area tent was used for a variety of purposes by customers. In addition to talking and reading, customers cleaned weapons, wrote letters, played cards and read books. There were occasionally 10-15 people waiting for clothes to wash or for a turn to wash.

There were a total of 56 CSSL questionnaires completed. In the event the responses do not total 56, it would be the result of some respondents not answering the question. The statistics are based solely on the responses. No assumptions were made for questions not answered. For rating satisfaction with specific aspects of laundry service, respondents could select on a scale of 1 through 7 for each question as shown below:

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
1	2	3	4	5	6	7

Table C-1. Rating the Ease of Loading Washer

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	0	0	0	3	11	40

n = 54

mean = 6.68

median = 7

Table C-2. Rating the Touch Panel Machine Load Capacity

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	0	0	1	1	10	31

n = 43

mean = 6.65

median = 6

Table C-3. Rating the Rotary Dial Machine Load Capacity

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	0	0	0	2	13	36

n = 51

mean = 6.66

median = 7

Table C-4. Rating the Ease of Switching Loads

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	0	0	2	2	17	33

n = 54

mean = 6.50

median = 7

Table C-5. Rating the Cleanliness of Clothes

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	0	0	1	2	18	31

n = 52

mean = 6.51

median = 7

Table C-6. Rating the Area Allowed for Folding Clothes

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	1	2	6	5	21	16

n = 51
mean = 5.78
median = 6

Table C-7. Rating the Convenience of Service

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	0	0	1	1	13	36

n = 51
mean = 6.64
median = 7

Table C-8. Rating the Overall Laundry Service

EXTREMELY DISSATISFIED	MODERATELY DISSATISFIED	SOMEWHAT DISSATISFIED	NEUTRAL	SOMEWHAT SATISFIED	MODERATELY SATISFIED	EXTREMELY SATISFIED
0	0	0	0	0	13	39

n = 52
mean = 6.75
median = 7

The typical user in this study used the CSSL for the first time and used the rotary dial units. There were 4 rotary dial machines and 2 touch panel machines.

For rating the difficulty/ease to operate the CSSL, respondents could select on a scale of 1 through 7 for each question as shown below:

EXTREMELY DIFFICULT	MODERATELY DIFFICULT	SOMEWHAT DIFFICULT	NEUTRAL	SOMEWHAT EASY	MODERATELY EASY	EXTREMELY EASY
1	2	3	4	5	6	7

Table C-9. Rating the Computerized Touch Panel Control Machines

EXTREMELY DIFFICULT	MODERATELY DIFFICULT	SOMEWHAT DIFFICULT	NEUTRAL	SOMEWHAT EASY	MODERATELY EASY	EXTREMELY EASY
0	0	0	1	3	6	17

n = 27
mean = 6.44
median = 7

Table C-10. Rating the Rotary Dial Controls

EXTREMELY DIFFICULT 0	MODERATELY DIFFICULT 0	SOMEWHAT DIFFICULT 0	NEUTRAL 0	SOMEWHAT EASY 2	MODERATELY EASY 7	EXTREMELY EASY 33
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n = 42

mean = 6.73

median = 7

Sixteen respondents indicated that they had used both machine types. Of these, 12 preferred the "touch panel" controls and 4 preferred the rotary dials. Respondents reported washing an average load of 14 lbs. Customers waited in line an average of 50 minutes. Times ranged from no wait to 90 minutes when water was available.

Outside temperature was generally 90 degrees Fahrenheit. Temperatures inside the laundry areas were rated on a scale of 1 through 3. The ends of the scale denote the extremes while the middle signifies the ideal. The scale is shown below.

TOO COLD	JUST RIGHT	TOO HOT
1	2	3

Table C-11. Rating the Tent Area (For Folding Clothes)

TOO COLD	JUST RIGHT	TOO HOT
0	43	3

n = 46

mean = 2.07

median = 2

Table C-12. Rating the Shelter Area (Containing Machines)

TOO COLD	JUST RIGHT	TOO HOT
0	41	6

n = 47

mean = 2.13

median = 2

In the tent area, soldiers reported cleaning weapons, writing letters, reading and playing cards as the typical activities while waiting for their laundry.

Soldiers were asked to compare the Self-Service Laundry to other laundry services provided in other deployments or exercises that they had participated. The scale is from 1 through 7 as shown below.

CSSL IS MUCH WORSE 1	CSSL IS MODERATELY WORSE 2	CSSL IS SLIGHTLY WORSE 3	CSSL IS NOT BETTER OR WORSE 4	CSSL IS SLIGHTLY BETTER 5	CSSL IS MODERATELY BETTER 6	CSSL IS MUCH BETTER 7
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Table C-13. Comparing the CSSL to Host Nation Support

CSSL IS MUCH WORSE	CSSL IS MODERATELY WORSE	CSSL IS SLIGHTLY WORSE	CSSL IS NOT BETTER OR WORSE	CSSL IS SLIGHTLY BETTER	CSSL IS MODERATELY BETTER	CSSL IS MUCH BETTER
0	0	0	0	1	2	13

n = 16
mean = 6.75
median = 7

Table C-14. Comparing the CSSL to the M532

CSSL IS MUCH WORSE	CSSL IS MODERATELY WORSE	CSSL IS SLIGHTLY WORSE	CSSL IS NOT BETTER OR WORSE	CSSL IS SLIGHTLY BETTER	CSSL IS MODERATELY BETTER	CSSL IS MUCH BETTER
0	0	0	1	1	1	12

n = 15
mean = 6.60
median = 7

Table C-15. Comparing the CSSL to the M85

CSSL IS MUCH WORSE	CSSL IS MODERATELY WORSE	CSSL IS SLIGHTLY WORSE	CSSL IS NOT BETTER OR WORSE	CSSL IS SLIGHTLY BETTER	CSSL IS MODERATELY BETTER	CSSL IS MUCH BETTER
0	0	0	1	1	1	11

n = 14
mean = 6.57
median = 7

Table C-16. Comparing the CSSL to the Containerized Laundry

CSSL IS MUCH WORSE	CSSL IS MODERATELY WORSE	CSSL IS SLIGHTLY WORSE	CSSL IS NOT BETTER OR WORSE	CSSL IS SLIGHTLY BETTER	CSSL IS MODERATELY BETTER	CSSL IS MUCH BETTER
0	0	0	0	1	1	10

n = 12
mean = 6.75
median = 7

Table C-17. Comparing the CSSL to Other (Handwashing, Contractor)

CSSL IS MUCH WORSE	CSSL IS MODERATELY WORSE	CSSL IS SLIGHTLY WORSE	CSSL IS NOT BETTER OR WORSE	CSSL IS SLIGHTLY BETTER	CSSL IS MODERATELY BETTER	CSSL IS MUCH BETTER
0	0	0	0	2	0	7

n = 9
mean = 6.55
median = 7

The soldiers provided narrative comments on the surveys. Some of these comments or suggestions are as follows:

1. "It is a great idea. My clothes are now at their cleanest. They haven't been this clean since I've been here. Thank you. This idea is a morale booster. Even in this rain!"

2. "A very good service. Very good for morale of troops. A much needed addition for any deployment."

3. "Having deployed with MILVANS, this laundry service is very well suited for a combat heavy engineer battalion. We have so many short tons to move our unit anyway (3500 ST) that an additional MILVAN would not necessarily affect our deployability. The trade off is immediate laundry service in theater."

4. "We need a larger water supply so you don't run out of water."

5. "Need more dryers"

6. "It works great. Need a lot more of them."

7. One soldier overheard to a friend: "You have to try it. I washed my pillow case yesterday and last night all I could smell was 'clean'. It was great."

8. "In Somalia laundry units were excellent. In Haiti they were sorry at times"

9. "Chairs would be a great comfort while waiting for the laundry. An extractor would be a good idea because it would shorten the time for dryers. Any way to shorten drying time would be greatly appreciated."

10. "The laundry service is overall excellent. Simply because it is easy to use you don't have to hand wash clothes or turn them in to supply. There you get to do your own laundry and don't have to worry about losing clothes with a turn in service."

11. "Field one unit to each BN sized unit."

12. "I think this was a great morale booster for being here."

13. "Need more washers and dryers for a battalion, but is good for a company. Excellent service. Thanks alot."

14. "It works great, need a lot more of them."

15. "It would be nice if there were 3 per unit or 1 per 100 soldiers."

16. "Liked laundry - do not like surveys."

17. "If possible more of the appliances are needed and more chairs and something to make time go quicker."

18. "A few more chairs would be nice. I am very happy with this facility. We needed it. Our clothes were just too dirty to handwash."

19. "Thank you for your support."

20. "Unfortunately, soldiers abuse services like this and destroy equipment. The wash/dryer station should be monitored by an orderly to preserve the equipment."

21. "Need more tables in the folding area. Overall extremely pleased."

22. "It was great!"

23. "Set up another tent with washer & dryer units cause some people work night shift like myself and we really don't want to spend our time waiting in line to wash clothes. Most of us would rather be sleeping."

24. "I was very happy to be able to use a washer and a dryer instead of washing by hand. It took away all the complications of doing it by hand. Thank you very much!"

25. "Very very good but could use more washers and dryers but otherwise terrific."

26. "Excellent and convenient idea."

27. "Wonderful!"

28. "The operators for the service were extremely helpful, very friendly and wanted to see satisfaction of the services for the soldiers. Thank you for such a good idea."

29. "We need an area with chairs."

30. "There should be more dryers than washers because the dryer has a longer running time."

31. "Should be a real boost."

32. "Workers were real friendly and there to help."

33. "It would be nice to have a folding and waiting area. Maybe some AFN on a radio too."

34. "The laundry service is extremely great. I wish it was here sooner."

INTERVIEW RESULTS

Interviews with the Command Group, CSM, Company Commanders and First Sergeants revealed unanimous support. The unit was viewed as a significant improvement in morale. Because of the road construction and quarry operations work conducted by this unit, clean clothes were seen as an mission enhancer, not merely a morale booster. No leader revealed any negative experiences caused by having the laundry located in the Bn area.

The largest requirement for laundry operations is water and power. Many units do not have available 30K generators. This must be fielded with the container, though it does have the capability to hook into commercial power if available. Water supply is more difficult. With a requirement for 8000-9000 gallons in a continuous 24 hour operation, water storage and delivery must be provided to units.

Prior to this study, this unit was sending 100-150 bundles of laundry to the QM laundry twice a week. Additionally, a 3000 gal water storage tank was set up to provide a wash area for soldiers to hand wash clothing. This was widely used. Once the self service laundry was in service, QM laundry bundles dropped to 36 for the entire week, and hand washing was being used only sporadically during the hours the laundry was waiting for water resupply.

RECOMMENDATION

Concept and materiel development documents for these items should continue to be developed. The Army should pursue adoption of a Non-Developmental Item (NDI) CSSL. The hot water capability of the prototype CSSL is not necessary and could be eliminated to reduce weight and cost. The data collected through this BLWE should be incorporated in an Operational Requirements Document (ORD) and resources provided to procure initial operational project stocks for use in future operations. The SUS has already been approved for purchase by units as a CTA item.

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